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COMMUNICATION IN THE WORK PLACE: AN ECOLOGICAL PERSPECTIVE

C. Burgess Ledbetter

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PREFACE

This report was prepared by C. Burgess Ledbetter, Research Architect, Applied Research Branch, Experimental Engineering Division, U.S. Army Cold Regions Research and Engineering Laboratory.

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COMMUNICATION IN THE WORK PLACE: AN ECOLOGICAL PERSPECTIVE

C. Burgess Ledbetter

INTRODUCTION

Look for the term "communication" in the index of any text on the operation of organizations and not only will you always find it, or a close derivative, but you will also see a substantial list of referred pages. This is because communication of ideas and information is essential to all organizations. According to Luthans (1972), communication, along with structure and technology, are three of the most important interacting elements making up the modern formal organizational environment. Yet classical organization theorists generally overlooked communication until it was emphasized by Barnard (1938) in his book, *The Functions of the Executive*.

Porter (1972) defines communication as the process of transmitting and receiving a message from one individual or place to another. According to Luthans (1972) there are two extremes to communication. One is that of information theory featuring sophisticated transmission; computerized information systems exemplify this extreme. The other extreme, and the one addressed in this report, is interpersonal communication, which can be both verbal and nonverbal. Verbal communication is, of course, spoken or written. Nonverbal communication includes such indicators as posture, facial expressions, tone of voice, etc.

In this report, the ways that architectural design influences the opportunities for communication are discussed. As Gutman (1972)

states, "It is only a short step from the chance to communicate to the act of communicating, and therefore to social interaction." Architecture can significantly influence this chance to communicate.

If social interaction and communication are so popular in literature, why write yet another report on the subject? Communication, as influenced by architecture, is not widely recognized. Managers at all levels of organizations who make many of the decisions that influence building design can benefit from this report. All workers will be better able to understand what is shaping their own behavior and that of their co-workers.

Allen and Furfeld (1976) state "... we know intuitively that the shape and organization of the buildings in which they work strongly influence the patterns of interaction among the inhabitants." While admitting the self-evidence of the design/interaction conclusion, Allen and Furfeld observe that their investigation of research and development establishments shows that these concerns are "... observed in the breach, if at all." They cite two reasons for the neglect.

1. Only recently has empirical research demonstrated the significance and importance of communication in organizations and therefore it has been overlooked by architects.

2. There has been little research on the nature and sensitivity of the relationship between physical layout and communication within buildings.

VALUE OF EFFECTIVE COMMUNICATION

Pelz and Andrews (1976), reporting on their study of R&D organizations, found a positive correlation between the amount of contact between colleagues and work performance.* This hypothesis that colleague contacts enhance performance was valid regardless of how the contacts originated. However, planned contacts, e.g. one person seeking out another for a specific work purpose, did have a higher payoff than unplanned or informally structured encounters. Even those persons who preferred not to work with others were not immune from this relationship.

Pelz and Andrews (1976) describe a variety of ways that contacts with colleagues result in greater performance and suggest the following possible statements as examples.

Providing advice—"Hook it to the red terminal and wait 10 minutes" or "Go see Fred, he knows all about it."

Coordination—"Why not ask Ruth to run it for you, I'm not keeping her too busy right now."

Catching an error—"You're crazy, Joe, the company couldn't possibly afford to produce it."

Encouragement—"Gee, Bill, it would be great if you could solve that one."

Relaxation and consolation—"Come on, John, you can't win them all, let's get a Coke."

Pelz and Andrews go on to identify other ways that interaction with colleagues helps performance, such as providing new ideas, putting in a full day's work, running an operation correctly, and providing "friendly (but nevertheless real) competition for promotion or recognition."

In discussing interpersonal relations at work, Warr and Wall (1975) begin by asserting what they consider obvious: that people want to be with others and that social groupings are inevitable both in work and outside. They cite the factor analytic studies of job satisfaction by Cross (1973), Herzberg et al. (1957), Vroom (1964), and Warr and Routledge (1969) as repeatedly demonstrating the presence of strong "other people" factors. People have a fundamental need to seek out variety and stimulation from their environment, and according to

Warr and Wall (1975), this is clearly reflected in social interaction.

Viewing the corporation as a social organization and not simply as a profit-oriented enterprise can result in methods of management that can increase profits. Johnson and Ouchi (1974) report on investigations of American and Japanese managers supervising workers in both Japan and the United States. Japanese managers supervising U.S. workers produced as many Sony color TV sets as their Japanese counterparts. But identically equipped semiconductor plants in Dallas and Japan, each managed by their respective countrymen, resulted in the Japanese out-producing their U.S. manager/employee counterparts by 15%.

Japanese managers emphasize information flow that occurs laterally and in an upward direction, whereas their American counterparts often place emphasis on downward flow. According to a *Newsweek* article (1974), "Japanese managers expect change and initiative to come from those closest to the problem, from sales people and assembly-line workers rather than from top executives."

Johnson and Ouchi (1974) quote a typical American manager's complaint, "I've spent my whole damned day on the telephone and I didn't get anything done because people kept interrupting me." Communication for the American is often viewed as a petty distraction from the job, whereas the Japanese manager views such communication as central to his job.

While improved styles of management emphasizing more communication in all directions would ostensibly increase worker performance, the previous observations about the American and Japanese managers should serve as a caution. This caution is that management textbooks in the U.S. may stress the importance of interpersonal communication, but management training alone will not assure changed attitudes and manager behavior. Other approaches to increasing productive social interaction and communication in the work setting should be implemented. One approach is the strategy of designing the work environment in ways that influence greater communication, even for those few persons who tend to resist informal styles of management and methods of operation.

This view of behavior control or influence is perhaps Orwellian. But it should be recognized that our behavior is already being influenced by architecture, most of which has been produced without knowing its effects, both good and bad.

* Performance measures included scientific contribution, overall usefulness, published papers, patents or applications and unpublished reports.

on our behavior. For this reason I would not only justify but strongly encourage intelligent application of the behavioral influence of architecture with the aim of enhancing the quality of life, including social interaction, communication and productivity.

Probst (1968) states that the business of people talking to each other in offices is the most expensive event that occurs in these buildings. The following breakdown by Forrest (1970) shows the 30-year cost of an average building, its furnishings, maintenance and total salaries of workers.

	Total cost (%)
Buildings and furnishings	2
Maintenance	6
Salaries	92

Optimum return on investment is therefore overwhelmingly dependent upon salaries or worker productivity. Productivity, communication, styles of management and methods of operation are interrelated and influenced in part by the physical layout of facilities. For example, Wells (1972) observes that a common entrance to different departments results in many more opportunities for interdepartmental contacts than if there were separate entrances. He further states that these interactions have an impact on the personal level of the individuals' lives as well as on the operation of the organization.

While this report emphasizes the influence of social interaction on the operation of the organization, the personal aspects of social interaction, such as developing friendships, should not be discounted. According to Steers and Porter (1975) this personal aspect also influences the operation of the organization. People tend to evaluate themselves according to what they have been able to accomplish. If they perceive that conditions on the job restrict their achieving full potential, they find it difficult to maintain a sense of purpose at work. These feelings then can lead to less job involvement, less job satisfaction and a lowered desire to perform. Steers and Porter (1975) go on to describe the value served by the social functions at work, such as the opportunity to meet new people and develop friendships. They observe that many employees appear to spend more time interacting with fellow workers than they do with their own families.

DESIGN INFLUENCES

A useful concept for understanding the influence of physical design on occupant behavior is that of the *focal point*. The focal point is the place within an installation or building that is accessible to and occupied by the greatest number and variety of occupants. The focal point is the place most used by both sexes, all races, and all echelons within the organization (blue collar and white collar, line and staff, production and office workers, technical and administrative, etc.).

The concept of focal points is taken from Barker and Wright's (1955) work on communities. The preceding description of the central focal point for an installation or building is the same as that for a community as used by Barker and Wright. By using Barker's (1968) method of investigation called the behavior setting survey, the scale can be reduced from a community down to an installation or building. In many work organizations, a centrally located cafeteria is often the focal point.

By continuing the adaptation of focal points toward a diminishing scale, portions of a building can be observed to contain "microfocal" points. At this scale, a section of a floor of a building or even several floors together will have a microfocal point.

Bechtel (1977) lists five principles for designing the most effective focal points. The focal point should have the following characteristics:

1. A central location for the occupants.
2. A location at the intersection of trafficways with necessary or popular functions, such as restrooms, photocopiers, etc., nearby.
3. An absence of formal activities of its own so that people come to it without having made a social or functional commitment to see or do anything in a formal sense.
4. A space as visually open as possible where people can see and be seen by others, both within the space and outside it.
5. A comfortable seating arrangement arranged for maximum exposure to, but without disturbing, the flow of pedestrian traffic.

All but this last characteristic are practical to apply universally to the microfocal point of a work organization. The microfocal point often occurs in or just off hallways. Idle conversation while sitting, unless the setting is work-related, is usually incompatible with getting work done.

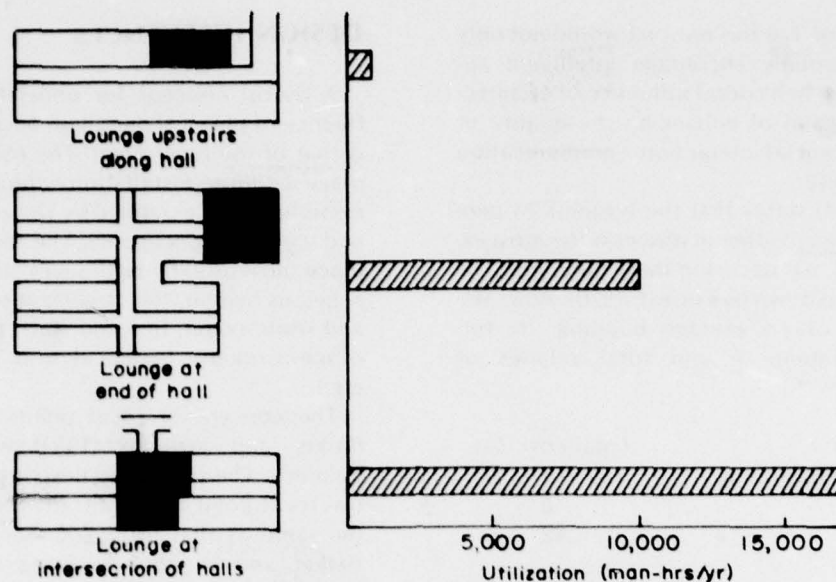


Figure 1. Utilization of officers' lounges at remote Air Force stations.

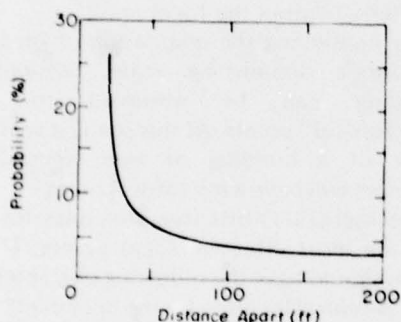


Figure 2. Probability of two people communicating at least once a week as a function of distance apart (after Allen and Furfeld 1976).

However, the formal break area, also a microfocal point, would be compatible with sitting and nonwork-related social behavior.

Often people are skeptical that the physical environment has any significant influence on their behavior. They prefer to believe that they do and go where they consciously choose, and this alone determines their behavior. According to Sommer (1969, 1972), the physical environment is usually considered no more than a backdrop. The following example from investigations of work environments in cold regions (Bechtel and Ledbetter 1976, and Ledbetter 1974) illustrates the powerful influence that

the design of microfocal points can have on occupant behavior.

The investigation of three remote Air Force stations in Alaska revealed a significant variance in lounge use as a function of:

1. Orientation of the lounge to hallways.
2. Circulation pattern through the lounge.

Other factors had minimal impact on the comparison. Station occupants were randomly selected for station duty, an equal amount of seating was provided, and the cost of amenities was the same. The lounge orientation and variance in use are shown in Figure 1.

The lounge at the intersection of hallways where the occupants could sit adjacent to, but out of, the flow of traffic was used 21 times more than the upstairs lounge. Although it took only a few seconds to walk across the lounge at the intersection, seldom would anyone pass through without stopping to talk to others. Design layout in this case was responsible for creating a situation fostering social interaction.

Allen and Furfeld (1976), in their investigation of the influence of design on communication in research and development laboratories, developed the graph shown in Figure 2 showing that proximity of people significantly influences the degree to which they communicate with each other. The approximate distance between offices which are six to seven rooms apart is 100 ft; this distance is also shown on a floor plan in Figure 3.

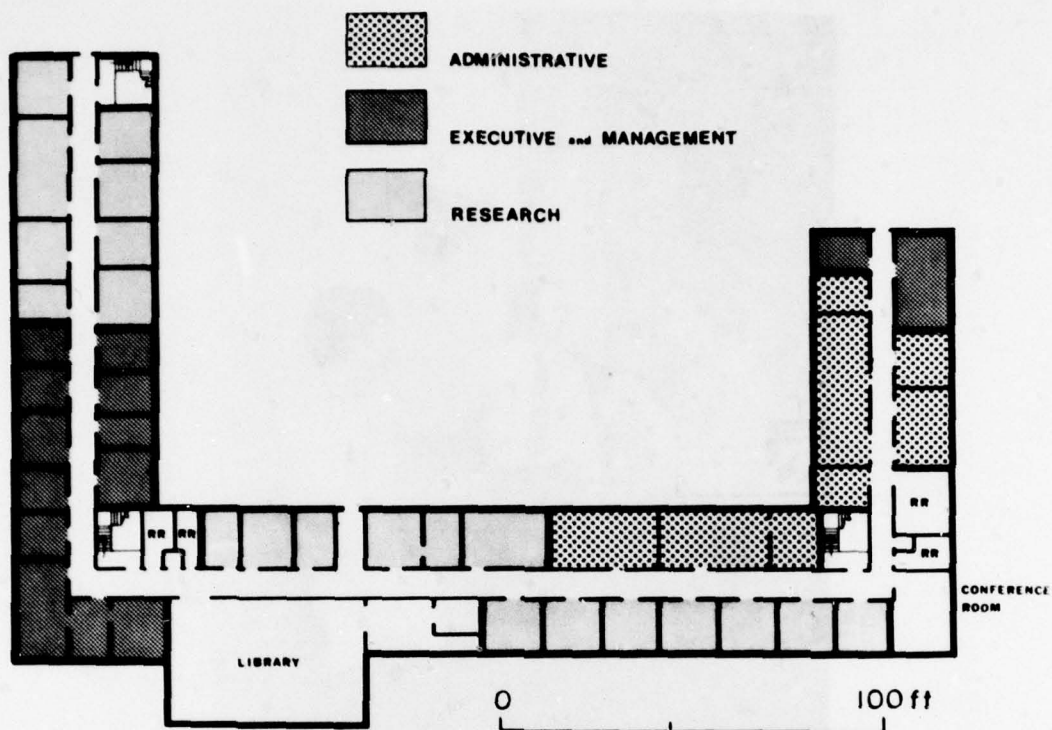


Figure 3. Double loaded corridor building at R&D Lab.

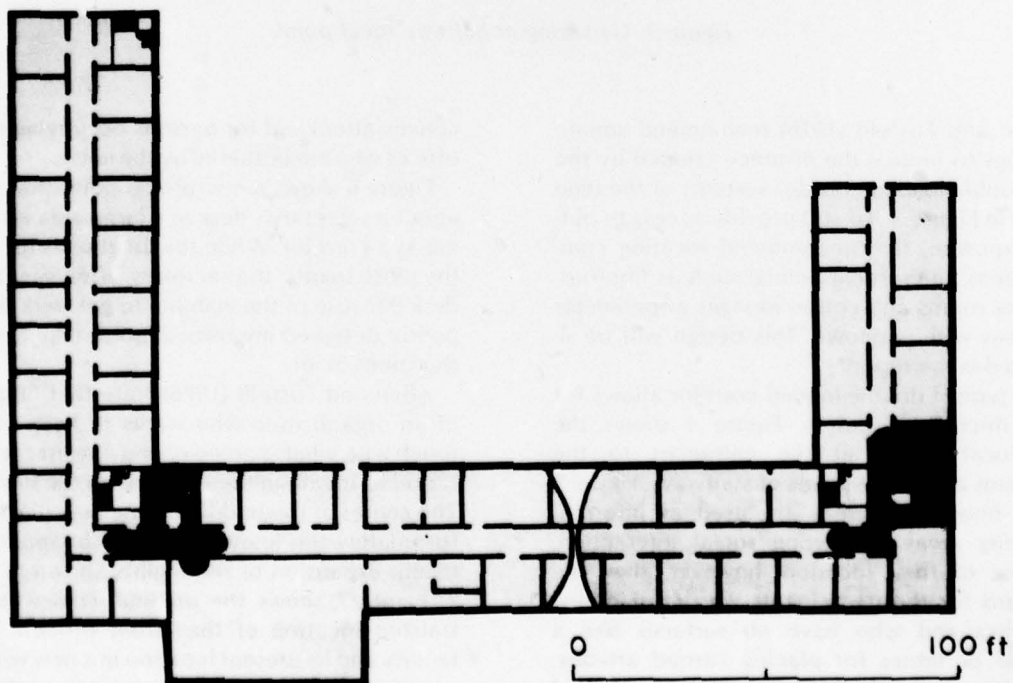


Figure 4. Microfocal points (black areas) serving the floor shown in Figure 3.

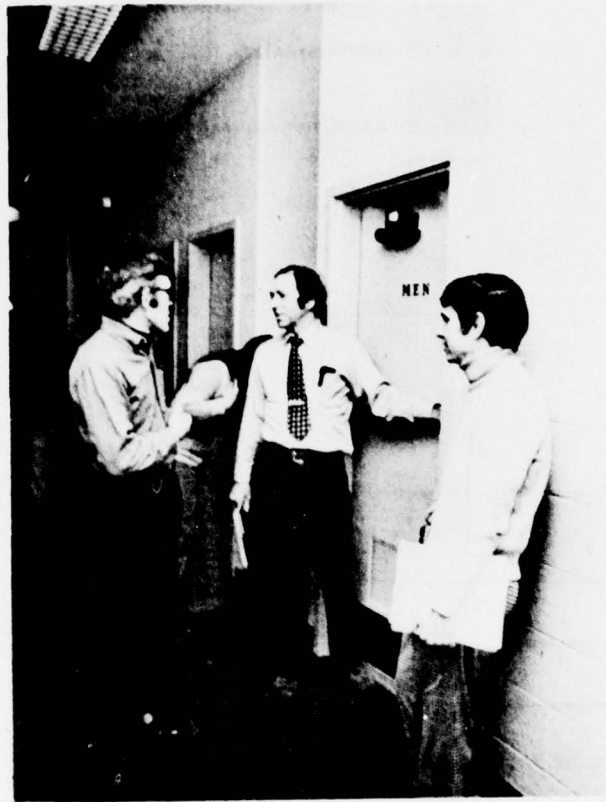


Figure 5. Gathering at hallway focal point.

Allen and Eusteld (1976) recommend square buildings to reduce the distance created by the long double-loaded corridor systems of the type shown in Figure 3. To still provide access to outside exposure, they recommend locating common areas (microfocal points) such as libraries, meeting rooms and coffee lounges at perimeter locations with windows. This design will be illustrated in this report.

The typical double-loaded corridor allows for some microfocal points. Figure 4 shows the microfocal points at the entrances to the restrooms and at the heads of stairways. Figure 5 shows how these areas are used as informal gathering areas supporting social interaction. Because of their location, however, they are awkward for the participants who must dodge passerbys and who have no surfaces like a counter or tables for placing carried articles. These informal gathering areas are also awkward for nonparticipants who must maneuver past them (unless, of course, they are drawn into the

conversation) and for persons occupying nearby offices who are bothered by the noise.

Figure 6 shows a microfocal point that occurs about a secretary's desk in a large area also serving as a corridor. While the location is useful for the participants, the secretary often vacates her desk because of the inability to get work done. A poorly designed microfocal point may be worse than none at all.

Allen and Eusteld (1976) state that "the head of an organization who wants to keep in close touch with what is going on must resist the temptation to locate in the corner with the best view. The center of the building is the best place." Unfortunately this knowledge was not applied to a recent expansion of the facility shown in Figure 7. Figure 7 shows the original, somewhat centralized location of the "front office" in this facility and its present location in a new wing.

The occupants of the new executive office are experiencing a strong sense of isolation from the other employees. Likewise, the employees sense

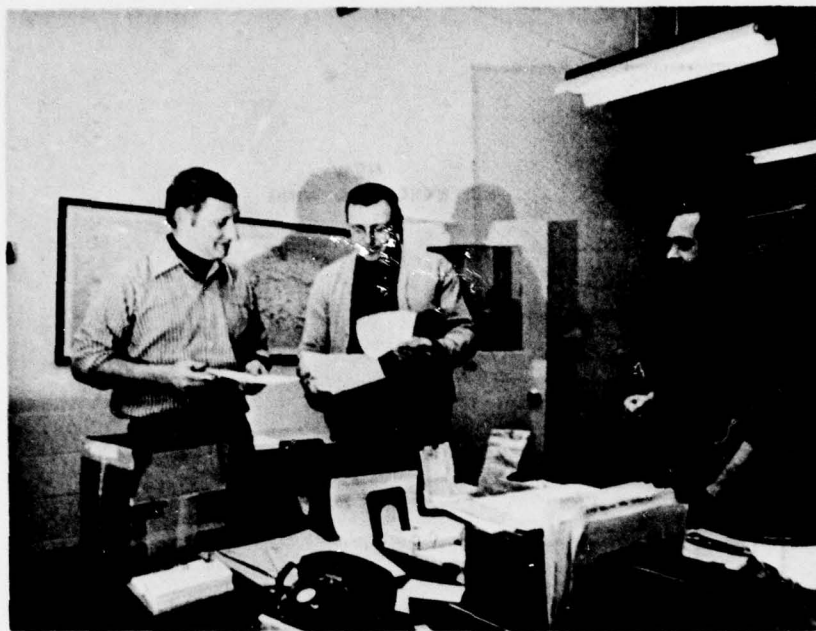


Figure 6. Gathering at the secretary's corridor desk.

isolation from top management personnel. To help overcome this, these top management personnel are spending more time out of their offices in an attempt to achieve at least the same level of involvement with the employees as they had in their previous location. As Probst (1968) cautions, the occupants of end of the corridor locations must "live outside of their offices" in order to remain active in the organization. When this is not recognized by the manager, the unconscious consequence is for him to resort to a more formal style of management involving written memos and other paperwork and more strict adherence to rigid chains of command, even in direct confrontation with informal lines of control that are more efficient and productive.

At a remote Air Force station, site layout problems were overcome by a commander who apparently recognized the stifling effect of an office out of the mainstream of traffic. Figure 8 shows an aerial view and Figure 9 a plan of the site with the commander's office centrally located but, due to the system of hallways, isolated from the dispersed informal gathering areas or microfocal points. At this location there were no opportunities to gather even informally in the hallways, as can be seen in the photograph in Figure 10.

This successful commander made a point of daily seeking out the various microfocal points such as the clubs, lounge, enlisted men's dining room, etc. By being consistent in his informal management behavior, he could go directly to the sources of problems and informally issue verbal orders to subordinates without antagonizing intermediate supervisors. Also, the commander could immediately hear about problems in their early stage from the people closest to the daily operations who possessed the means to correct them.

Management analysts at the headquarters for the Alaskan stations noted that this station operated in a dramatically improved manner during the one-year tour of this commander. Chaplain's reports, paperwork forwarded to headquarters, performance evaluations, practice alerts, and even such obscure measures as a three-fold increase in Base Exchange sales attest to the high morale at the station and the success of this commander's use of informal management. Shortly after the commander was transferred, the station returned to its prior level of lower performance.

In the work environment, many attempts at informality have been unsuccessful. The usual

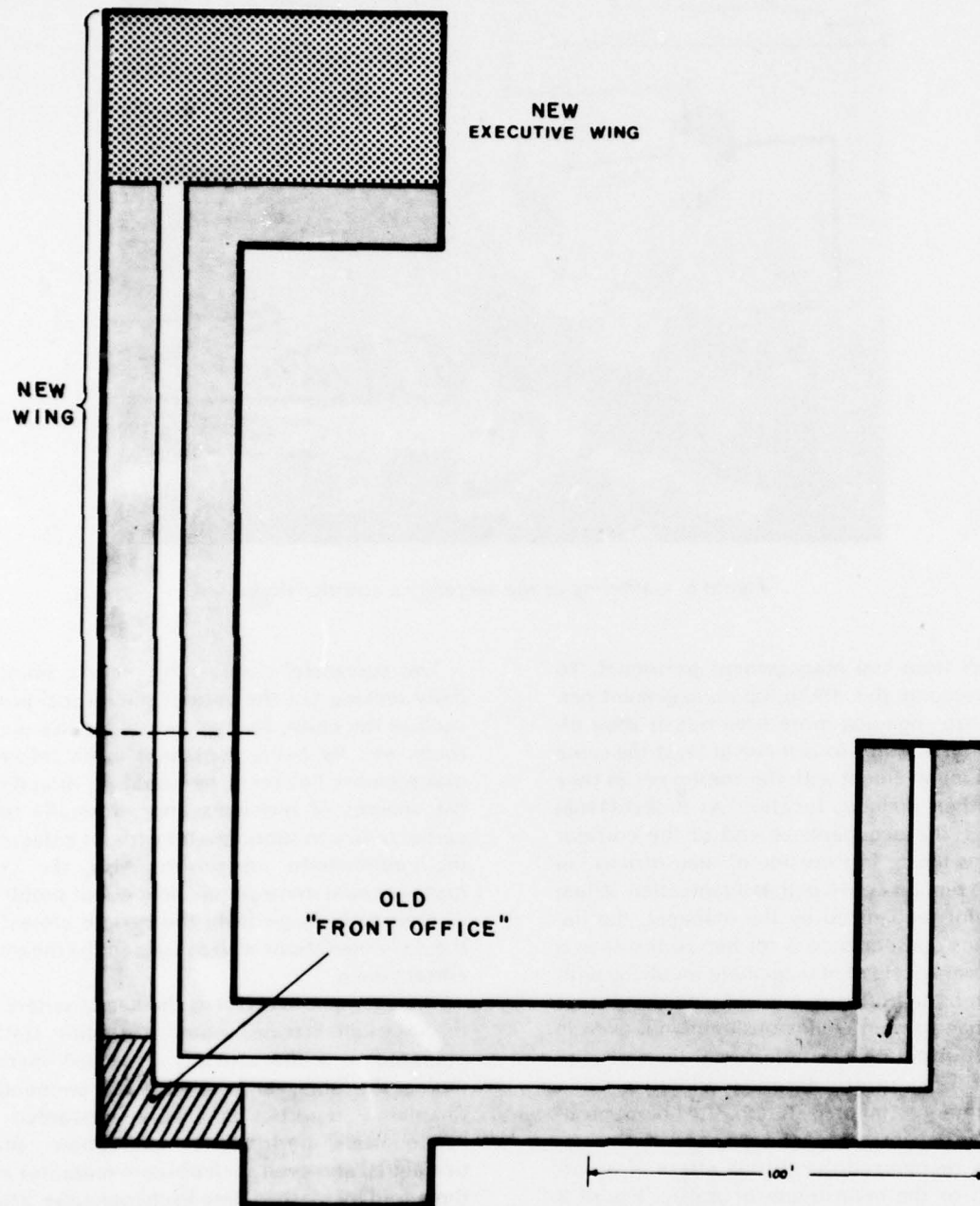


Figure 7. Expansion to the R&D Lab shown in Figure 3.

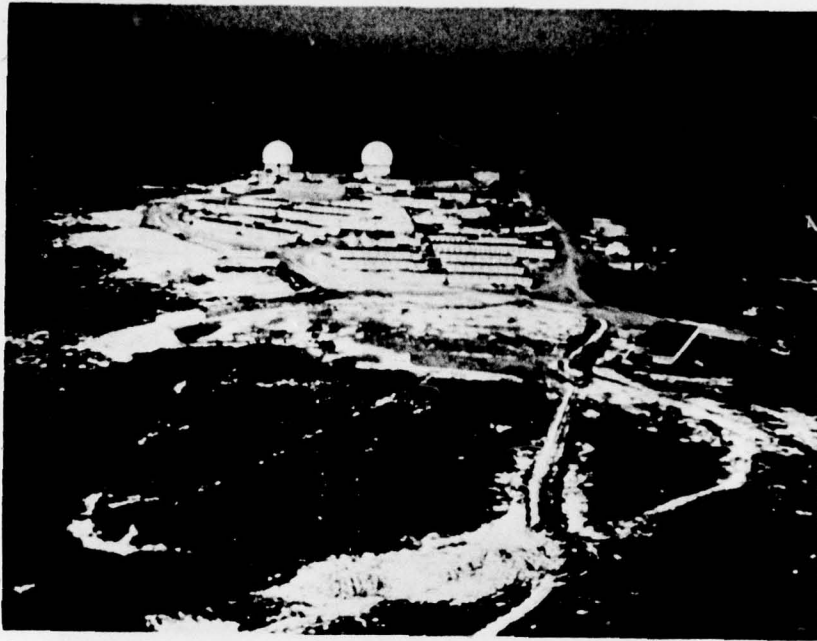
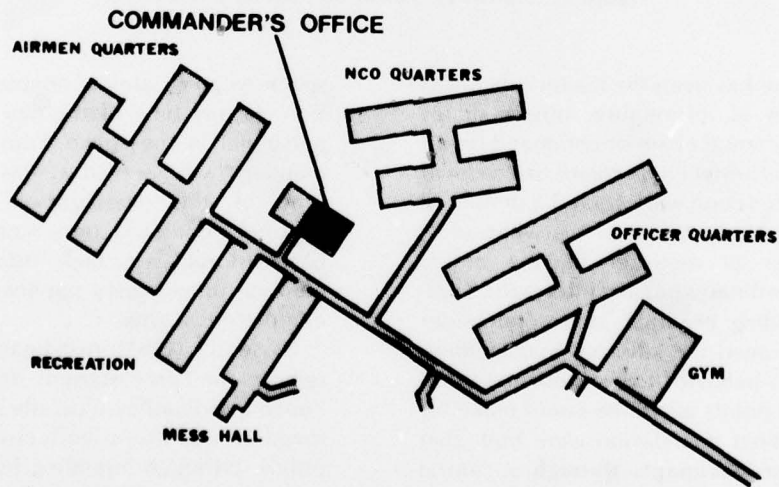


Figure 8. Aerial view of remote Air Force station in Alaska.



Note commander's office in relation to dispersed informal gathering areas (focal points).

Figure 9. Buildings at remote Air Force station.



Figure 10. Hallways that inhibit social interaction.

reason for failure has been the leader's *inconsistent* application of informality. Intermediates who expect the formal chain of command for *all* matters or the informal chain for *all* matters will not tolerate or function well when the predicted chain is broken haphazardly at the whim of 1) the commander or manager passing orders down, or 2) subordinates passing information up.

In the preceding example, one commander recognized the need for informal management and adapted his behavior to seek out the informal microfocal points where he could make his system work. What if a station were built that funneled all the occupants through a central focal point, thereby assuring that the commander could not become isolated? Such a station exists. Figure 11 shows a floor plan of the area immediately surrounding this central focal point and Figure 12 is a picture of this central space.

The commander's office is just off this central space, which the occupants quickly adapted to a lounge. The commander must pass through this

space to go to almost anyplace at the installation. At any time of the day he will encounter personnel in the space. Four of the five commanders* who served at this station up to the time of the investigation (Ledbetter 1974) routinely operated on a consistently informal basis. Morale was high, little time was spent creating unnecessary paperwork and work was completed on time.

Possenti's (1965) investigation of these same remote Air Force stations determined that the "open door" policy typically advertised by commanders was often ineffective. The open door policy, although intending to encourage informal communications, really meant that if the

*Personnel at one station and at the Alaska Air Command unofficially reported to investigators that one commander was relieved of command after several months at the station. He allegedly isolated himself in his quarters and left the running of the station to subordinates.

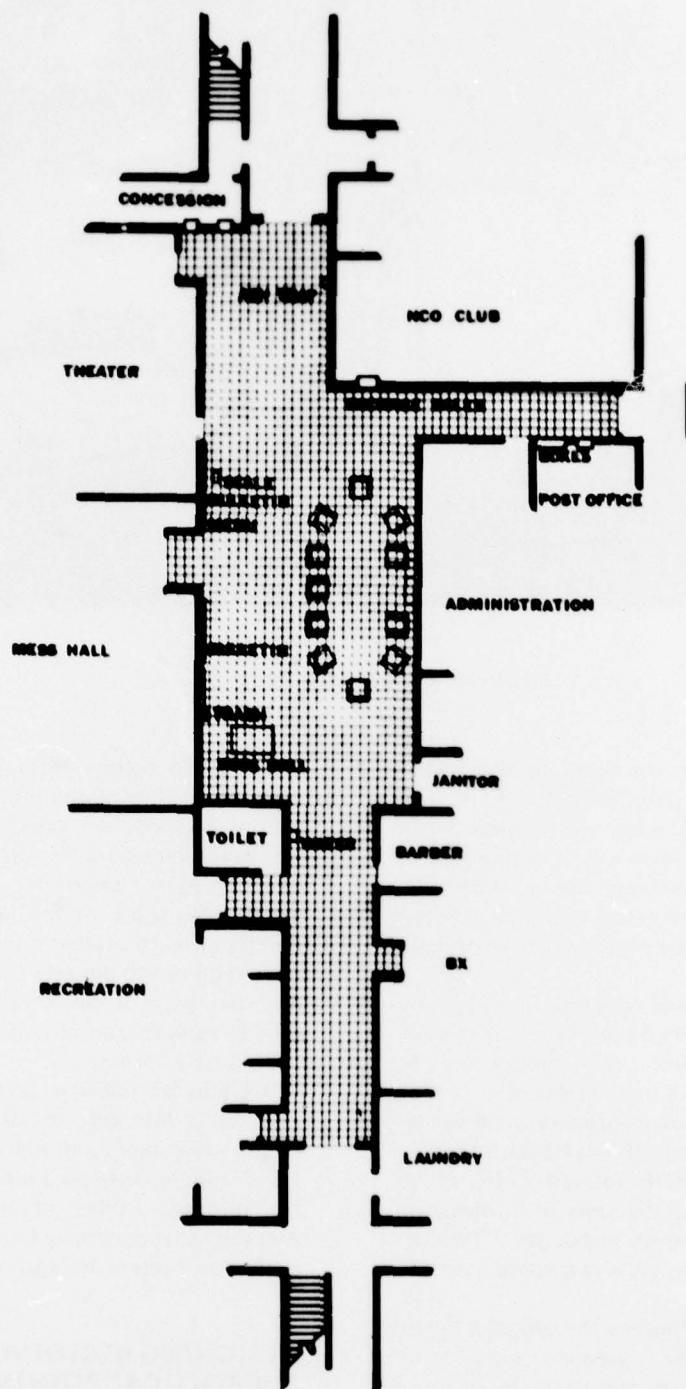


Figure 11. Central focal point at remote Air Force station.

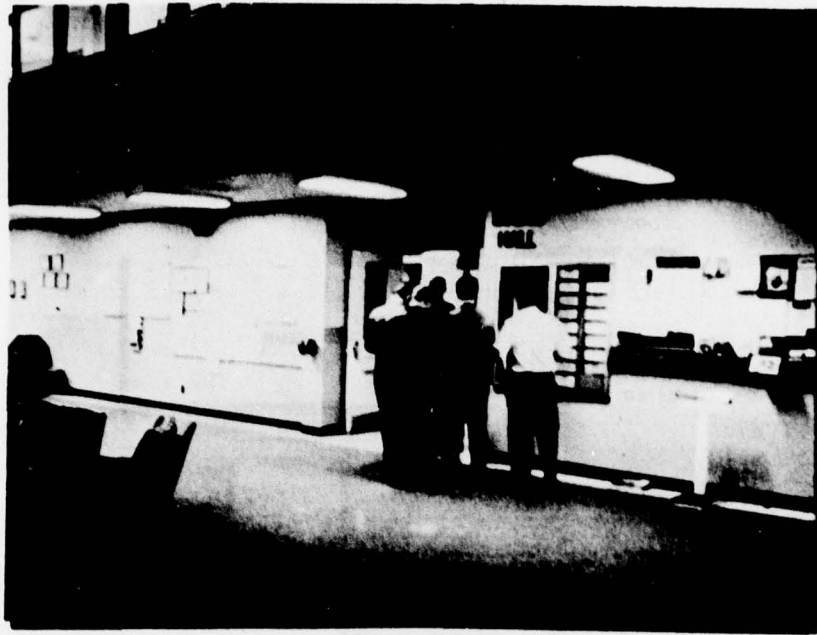


Figure 12. Central focal point in use.

problem were "worth" bringing to the supervisor's attention, the man might risk it. The typical "open door" session was conducted in the commander's office in a formal manner. In contrast to office meetings, the informal encounters in focal and microfocal points offer an excellent opportunity to explore even seemingly minor concerns.

These seemingly minor concerns, as judged by outsiders and managers having a lot of responsibilities, are in fact very important to employees and enlisted men. Lewis et al. (1974), in their investigation of icebreaker crew operations, confirm Downard's (1968) findings that "... clearly, morale is directly related to the effective communication to the crew of information which they consider to be important." They go on to state that this principle is ignored by many commanders.

Walton (1972) emphasizes the growing desire among workers for greater social interdependence. He gives the example of a pet food plant built in 1971 that was designed to facilitate communication and informal management and operations. There were no executive parking spaces, a single entrance served both office and plant workers, and the same decor was used throughout for both office and plant

workers. To follow through with the goal of creating ad hoc gatherings for work coordination, the typical air conditioned control room was made larger for the process team operators to congregate when not on duty elsewhere. What were some of the benefits of this plant compared with others? One-third fewer workers were required to operate the plant, the overhead required was $\frac{1}{3}$ less, there were 92% fewer quality rejects, and absenteeism was 9% below the industry normal.

Architectural design can lead to greater social contact. When this social contact occurs between co-workers and management in informal focal and microfocal points, the opportunities for informal styles of management are increased. This generally leads to greater productivity, satisfaction and quality of work life.

DESIGNING BUILDINGS WITH MICROFOCAL POINTS

Allen and Fustfeld (1976) recommend a square building over the long rectangular structure. This is best for energy conservation because a square structure contains fewer windows and approximately 20% less exposed surface area than

a conventional rectangular structure of the same internal square footage (Fig. 3). The smaller the surface area and window area, the smaller the heat loss.

By locating the windows at the focal and microfocal points where people gather, and reducing or eliminating windows in all other areas, the window surface area for buildings can be reduced by as much as 72% over that of conventional rectangular, double-loaded corridor buildings such as the laboratory in Figure 3.

Buildings designed for cold climates must consider energy conservation. Two building concepts were developed for office buildings which reflect both a concern for energy and occupant behavior.

Figure 13 shows a square building with a perimeter corridor. This thermally tempered corridor serves as a thermal buffer between the office areas, where the temperatures must be relatively warm, and the cold outdoor conditions. Such an office building is best suited for multiple tenant use, that is, by small independent organizations.

The microfocal points are lounges at the corners of each floor. Restrooms and other shared services such as mail distribution, coffee vending, photocopying, etc., are located in these areas. Since the tenants are independent of each other, management practices are not affected. However, the opportunity for social interaction among tenants improves the enjoyment of working and would perhaps lead to efficient shared work functions, such as one organization loaning extra help to other tenants.

Figure 14 is a building layout best suited to a large single tenant. The office areas face an open, naturally lighted central core, which is open through several floors but covered with a skylight. A partial glass wall faces south. Windows along the stairway allow workers to see out from a thermally tempered buffer area. The sketch of the central core of such a proposed building is shown in Figure 15.

An example of a microfocal point applied to encourage office workers to interact with industrial shop workers is shown in Figure 16. An advantage of such an area is that it provides a clean and quiet place adjacent to the work areas for several people, or even a classroom-size group, to meet and discuss drawings, work methods, etc. Figure 17 illustrates how an area like this might look from the shop floor.

Buildings need not be new to incorporate effective microfocal points. Figure 18 shows what might be done to the laboratory shown in Figures 3 and 4 to take advantage of the weak microfocal points already present at the restrooms and stairs.

In Figure 18 a room is given up to allow the microfocal point to expand and accommodate the behavior that is trying to occur now. Chairs and tables allow these areas to serve as break areas and places for people to engage in spontaneous professional discussions. Blackboards further enhance the opportunity to carry on these spontaneous discussions. Bulletin boards, a photocopier and vending machines would further ensure utilization.

CONCLUSION

Too often, social interaction at work is viewed as wasting time. In fact, strategically designing the facilities to accommodate social interaction will increase the available time for productive work. For example the cold regions study of facilities (Bechtel and Ledbetter 1976, Ledbetter 1977) found that workers tend to spend more time in nonwork related conversation when they take coffee breaks at their desk rather than using a break room. Apparently people only give the impression of working hard when they take breaks at their desks. Furthermore, the opportunity for encountering a broad range of people within the organization, which can be done in a common break room, is lost.

Social interaction and flow of communication can be analyzed and predicted. Both the management and the facility planner must be made aware and held responsible for this aspect of the organization. It may be that the little recognized but easily understood influences of architectural design on user behavior will be critical to new trends in job redesign (Organizational Dynamics 1975).

The manager who is unable to change the design of his environment can modify his or her behavior to overcome obstacles, as did the top managers in the new executive wing from Figure 8 and the commander at the Air Force station in Figure 10. Likewise, the worker can seek out microfocal points and take advantage by engaging supervisors when they come into these areas. When changes are made, the concept of focal

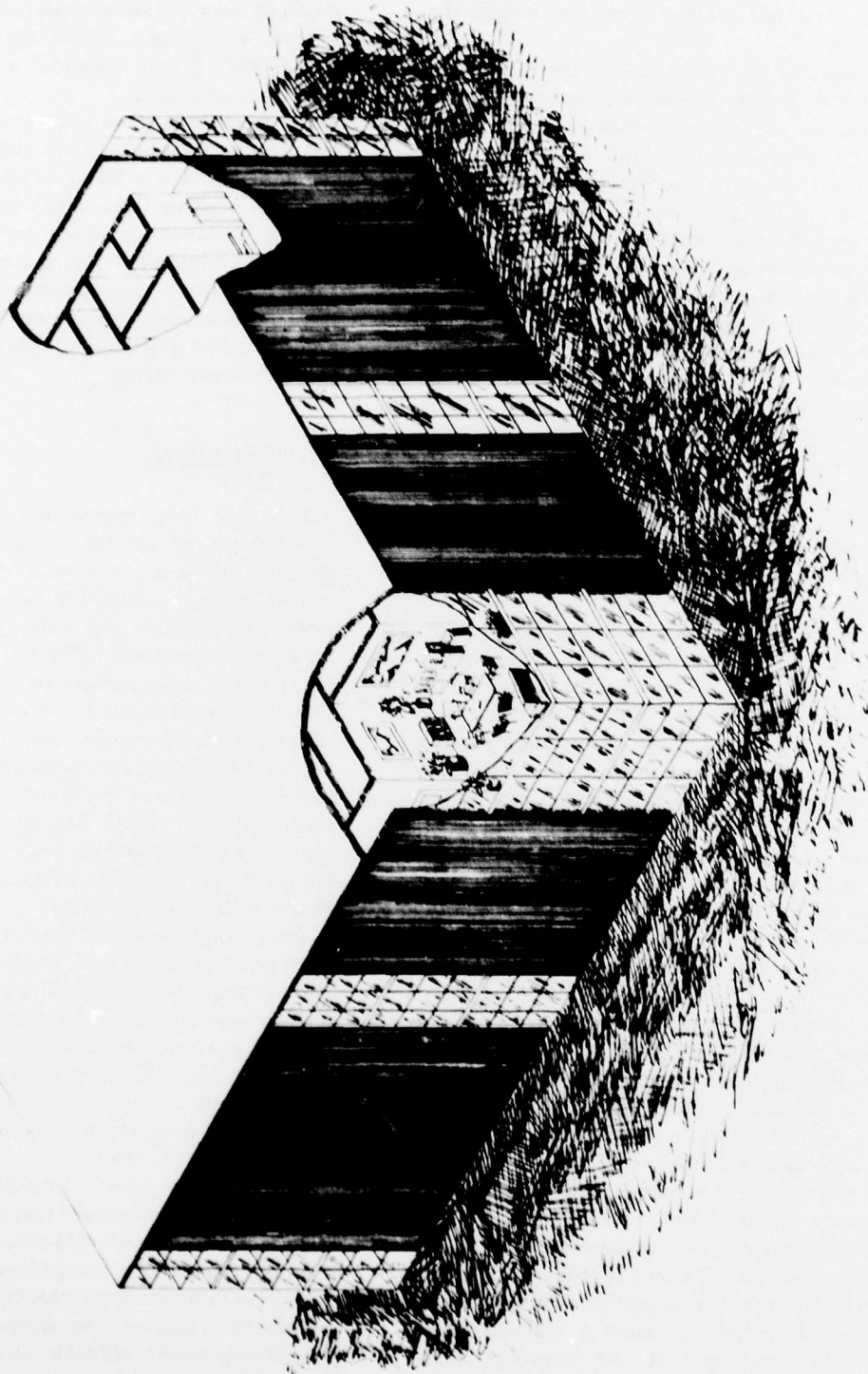


Figure 13. Perimeter hallway building for multiple independent tenants.

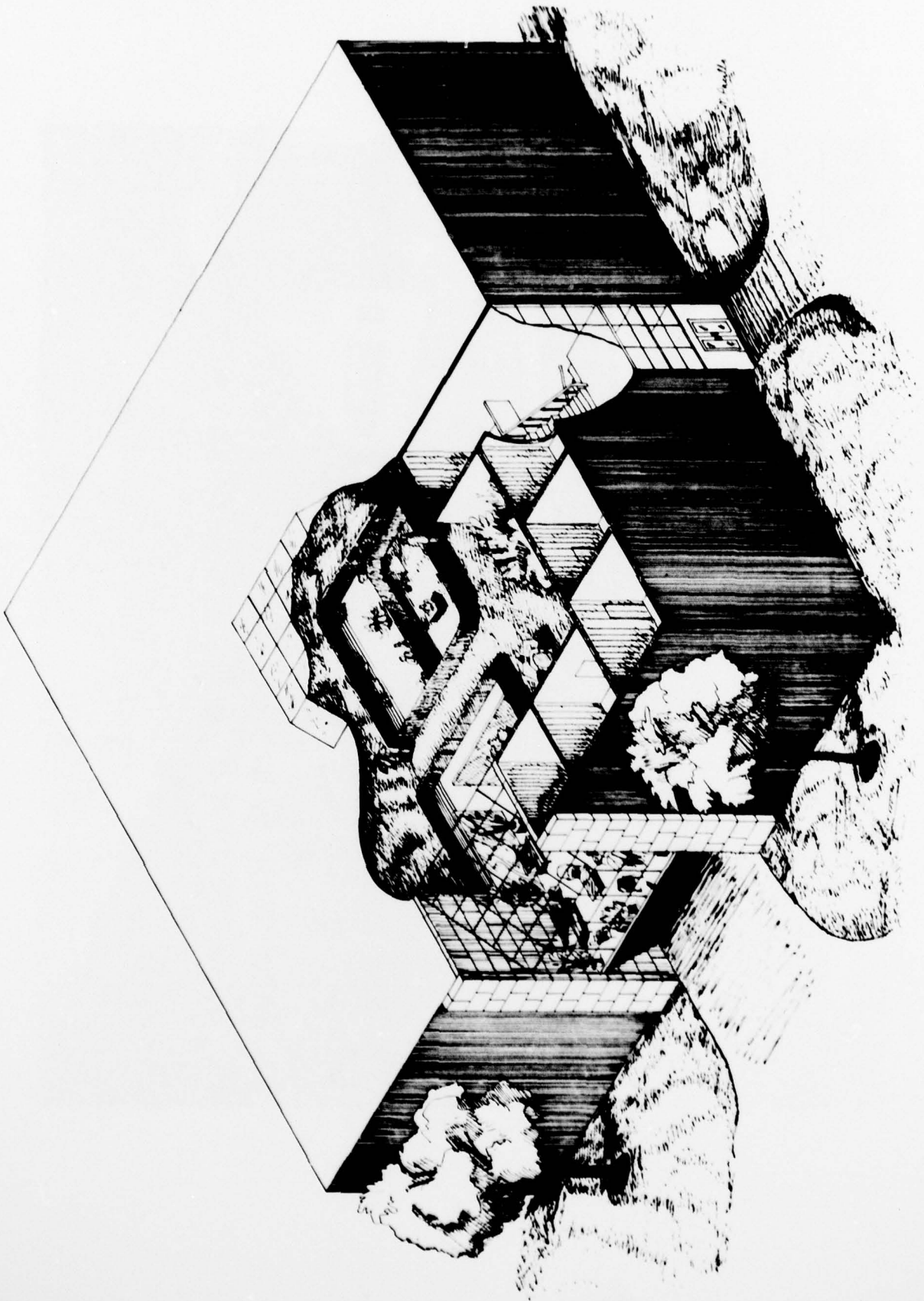


Figure 14 Central core building for single tenant use.



Figure 15. Central core.

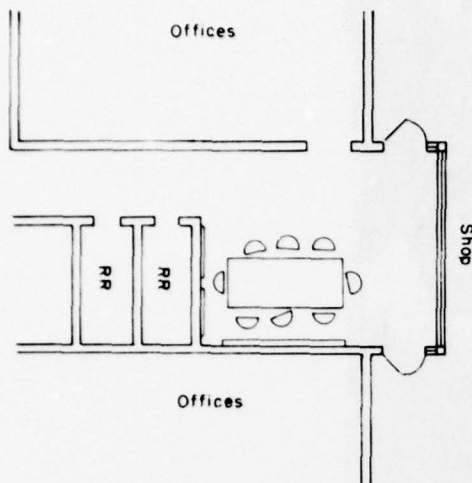


Figure 16. Microfocal point for office and shop workers.

points can be applied as shown in Figure 18. A saying by Winston Churchill serves as an appropriate ending: "First we shape our surroundings, then our surroundings shape us..."

LITERATURE CITED

- Allen, T.J. and A.R. Fustfeld, A.R. (1976) Design for communication in the research and development lab. *Technology Review*, vol. 78, no. 6, p. 64-71.
- Barker, R. (1968) *Ecological psychology: Concepts and methods for studying the environment of human behavior*. Stanford University Press, Stanford, Calif.
- Barker, R. and H. Wright (1955) *Midwest and its children*. New York: Row, Peterson.
- Barnard, C. (1938) *The functions of the executive*. Cambridge, Mass.: Harvard University Press.
- Bechtel, R. (1977) *Enclosing behavior*. Stroudsburg, Pa. Dowden, Hutchinson and Ross, Inc.
- Bechtel, R.B. and C.B. Ledbetter, (1976) The temporary environment: Cold Regions Habitability. CRREL Special Report 76-10. AD A032353.
- Cross, D. (1973) The worker opinion survey: A measure of shop-floor satisfactions. *Occupational Psychology*, vol. 47, p. 193-208.
- Downard, J.M. (1968) Managers at sea. *Journal Hon. Company of Mostes Mariners*, vol. X, p. 114.
- Forrest, G. (1970) The office-environmental planning design. Information Canada, Cat. No. ID 41-1369, Halifax, Nova Scotia, Canada.
- Gutman, R. (Ed.) (1972) *People and buildings*. New York: Basic Books.
- Herzberg, F., R. Mausner, R.D. Peterson and D.F. Capwell (1957) *Job attitudes: Review of research and opinion*. Psychological Service of Pittsburgh.
- Johnson, R.T. and W.G. Ouchi, (1974) Made in America (under Japanese management). *Harvard Business Review*, vol. 52, no. 5, p. 61-69.
- Ledbetter, C.B. (1974) Undermanning and architectural accessibility. CRREL Special Report 213. AD A001348.
- Ledbetter, C.B. (1977) Guidelines for architectural programming of office settings. CRREL Special Report 77-5. AD A037125.
- Lewis, R., D. Pearce, W. Garland and G. Goodfellow, (1974) Ship habitability: Designing polar icebreakers for crew leisuretime activities and facilities. Defence and Civil Institute of Environmental Medicine Report 74-R-1070, Department of National Defence, Downsview, Ontario, Canada, p. 8-11.
- Luthans, F. (1972) *Contemporary readings in organizational behavior*. New York: McGraw-Hill Book Company.
- Newsweek (1974) Management. The Japanese touch. vol. LX-XXIV, p. 60.
- Organizational Dynamics (1975) Job redesign on the assembly line: Farewell to blue-collar blues. In *Motivation and work behavior* (R.M. Stears and L.W. Porter, Eds.), New York: McGraw-Hill, Inc. p. 400-417.
- Pelz, D.C. and F.M. Andrews (1976) Scientists in organizations: Productive climate for research and development. Institute for Social Research, University of Michigan, Ann Arbor, Michigan.
- Porter, G.W. (1972) Non-verbal communications. In *Contemporary readings in organizational behavior* (F. Authors, Ed.), New York: McGraw-Hill Book Company, p. 161-171.
- Possenti, R.G. (1965) The effect of arctic isolation on human performance. In *Proceedings of the 15th Alaskan Science Conference*, College, Alaska, p. 444-447.
- Probst, R. (1968) The office—A facility based on change. Herman Miller Research Corporation, Ann Arbor, Michigan.
- Sommer, R. (1969) *Personal space*. San Francisco: Pinchart Press.
- Sommer, R. (1972) *Design awareness*. San Francisco: Pinchart Press.
- Steers, R.M. and L.W. Porter (1975) *Motivation and work behavior*. New York: McGraw-Hill.
- Vroom, V.H. (1964) *Work and motivation*. New York: Wiley and Sons.
- Walton, R.E. (1972) How to counter alienation in the plant. *Harvard Business Review*, November-December, p. 70-81.
- Warr, P. and Routledge, T. (1969) An opinion scale for the study of managers' job satisfaction. *Occupational Psychology*, vol. 43, p. 95-109.
- Warr, P. and T. Wall (1975) *Work and well-being*. Baltimore: Penguin Books.
- Wells, W.P. (1972) The psycho-social influence of building environment: Sociometric findings in large and small office spaces. In *People and buildings* (R. Gokman, Ed.), New York: Basic Books, p. 97-119.

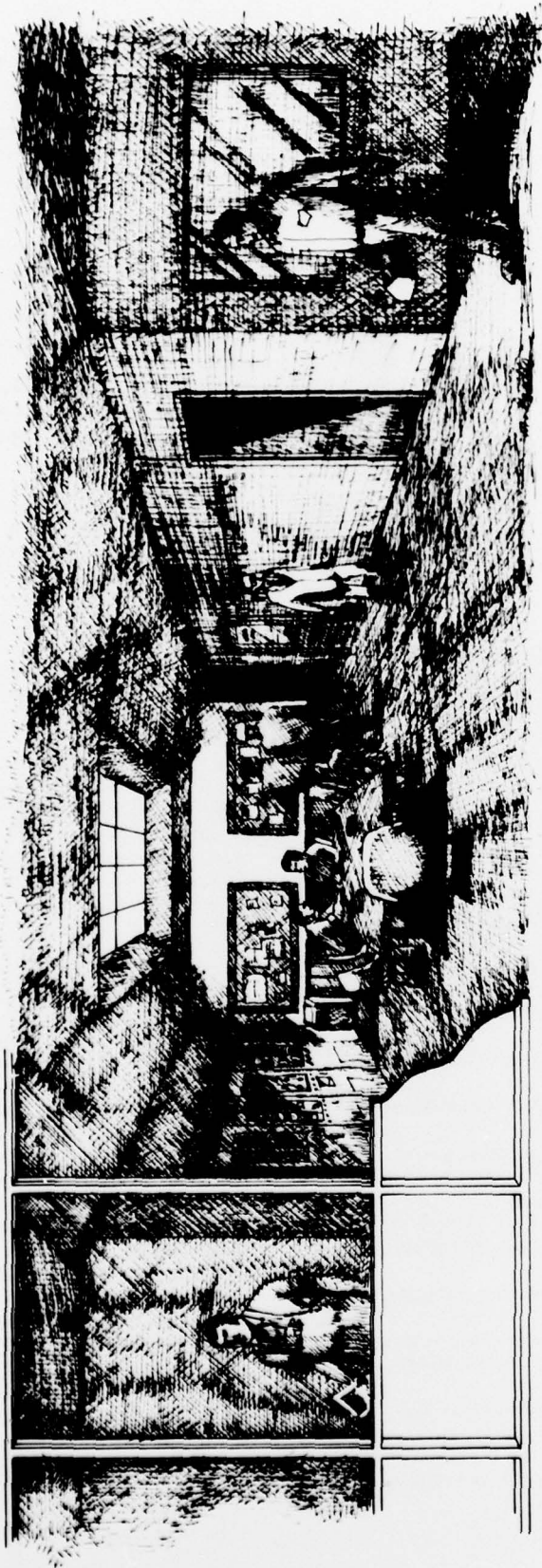


Figure 17. View of shop microfocal point.

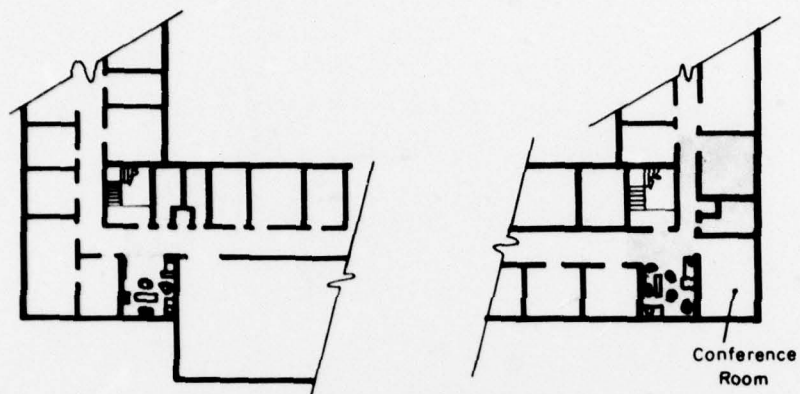


Figure 18. Modifications to plan shown in Figure 3 and 4.